

REMARKS

The Office Action dated March 10, 2005 required restriction of the claims into two claim Groups. In response, Applicants elect Group 1, namely claims 1-14.

1. (PREVIOUSLY PRESENTED) A method of providing a single system image in a clustered environment comprising:

assigning an internet protocol (IP) address as a cluster IP address;

binding the cluster IP address to a node in a cluster;

receiving a client request directed to the cluster IP address;

multicasting the request to all nodes in the cluster;

each node in the cluster filtering the request based on a dynamically adjustable workload distribution function on each node, wherein the function is configured to allow a single node to process the client request;

a single node in the cluster obtaining a response to the request;

the single node inserting a cluster media access control (MAC) address into the response;

and

sending the response from the single node to the client.

2. (ORIGINAL) The method of claim 1 further comprising informing other nodes in the cluster of the cluster IP address and a media access control (MAC) address associated with the node that is bound to the cluster IP address.

3. (ORIGINAL) The method of 1 further comprising:

(a) forming a virtual local area network (VLAN) comprising:

(1) a master node wherein the master node is the node that is bound to the cluster IP address;

(2) at least one network interface for each node in the cluster; and

(b) wherein multicasting comprises packet forwarding and processing the client request from the master node to the other nodes in the VLAN.

4. (ORIGINAL) The method of claim 1 further comprising:

forming a multicasting group comprising all of the cluster nodes; and

wherein the multicasting comprises automatically multicasting the request to all of the cluster nodes in the multicasting group.

5. (ORIGINAL) The method of claim 4 wherein the multicasting group is formed by setting the MAC addresses of network interface cards of nodes in the cluster to be a multicast MAC address.

6. (ORIGINAL) The method of claim 5 wherein the MAC addresses are set by setting a first bit of a first byte to a certain value.

7. (ORIGINAL) The method of claim 1 wherein the workload distribution function is installed in a driver on each node in the cluster.

8. (ORIGINAL) The method of claim 1 wherein the workload distribution function filters the client request based on workload distribution and whether a packet header of the client request indicates that destination MAC and IP addresses are the cluster IP and cluster MAC addresses.

9. (ORIGINAL) The method of claim 1 wherein the response is sent from the single node to the client without multicasting.

10. (PREVIOUSLY PRESENTED) The method of claim 1 wherein the workload distribution function distributes the workload by performing a mod operation of a source IP address with a number of nodes in the cluster.

11. (PREVIOUSLY PRESENTED) The method of claim 1 wherein the workload distribution function distributes the workload by:

representing a total workload observed by the cluster as a bitmap with a number of bits k;
obtaining a bit m by performing a mod operation of a source IP address of the client by the number of bits k; and

assigning the client request to a cluster node that has a specified value at bit m.

12. (ORIGINAL) The method of claim 1 wherein the workload distribution function distributes the workload based on workload statistics that are periodically collected by at least one cluster node.

13. (ORIGINAL) The method of claim 12 wherein cluster nodes periodically exchange workload statistics information.

14. (ORIGINAL) The method of claim 1 further comprising:
adjusting a number of nodes in the cluster;
recomputing a workload distribution based on the number of nodes in the cluster; and
redistributing the workload among nodes in the cluster based on the recomputation.

15. (WITHDRAWN) An apparatus for providing a single system image in a clustered environment comprising:

(a) a master node in a storage cluster, wherein a node in the storage cluster is designated as the master node by assigning an internet protocol (IP) address as a cluster IP address and binding the cluster IP address to the master node, wherein the master node is configured to:

- (1) receive a client request directed to the cluster IP address;
- (2) multicast the request to all nodes in the cluster;

(b) at least one additional node in the storage cluster;
(c) a dynamically adjustable workload distribution function installed on each node in the cluster, wherein the function is configured to filter the client request by allowing a single node to process the client request;

wherein each node in the cluster is configured to:

- obtain a response to the request;
- insert a cluster media access control (MAC) address into the response; and
- send the response from the single node to the client.

16. (WITHDRAWN) The apparatus of claim 15 wherein the master node is further configured to inform the other nodes in the cluster of the cluster IP address and a media access control (MAC) address associated with the master node.

17. (WITHDRAWN) The apparatus of claim 15 wherein:
the storage cluster comprises a virtual local area network (VLAN); and
the master node is configured to multicast the request by packet forwarding and processing the client request from the master node to the other nodes in the VLAN.

18. (WITHDRAWN) The apparatus of claim 15 wherein:
the storage cluster comprises a multicasting group comprising all of the cluster nodes; and
the master node is configured to multicast by automatically multicasting the request to all of
the cluster nodes in the multicasting group.

19. (WITHDRAWN) The apparatus of claim 18 wherein the multicasting group is
formed by setting the MAC addresses of network interface cards of nodes in the cluster to be a
multicast MAC address.

20. (WITHDRAWN) The apparatus of claim 19 wherein the MAC addresses are set by
setting a first bit of a first byte to a certain value.

21. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution
function is installed in a driver on each node in the cluster.

22. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution
function filters the client request based on workload distribution and whether a packet header of the
client request indicates that destination MAC and IP addresses are the cluster IP and cluster MAC
addresses.

23. (WITHDRAWN) The apparatus of claim 15 wherein the response is sent from the
single node to the client without multicasting.

24. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution
function distributes the workload by performing a mod operation of a source IP address with a
number of nodes in the cluster.

25. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution
function distributes the workload by:

representing a total workload observed by the cluster as a bitmap with a number of bits k;
obtaining a bit m by performing a mod operation of a source IP address of the client by the
number of bits k; and
assigning the client request to a cluster node that has a specified value at bit m.

26. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution function distributes the workload based on workload statistics that are periodically collected by at least one cluster node.

27. (WITHDRAWN) The apparatus of claim 26 wherein cluster nodes periodically exchange workload statistics information.

28. (WITHDRAWN) The apparatus of claim 15 wherein the workload distribution function is further configured to adjust a number of nodes in the cluster by:

recomputing a workload distribution based on the number of nodes in the cluster; and
redistributing the workload among nodes in the cluster based on the recomputation.

29. (WITHDRAWN) An article of manufacture, embodying logic to perform a method of providing a single system image in a clustered environment, the method comprising:

assigning an internet protocol (IP) address as a cluster IP address;
binding the cluster IP address to a node in a cluster;
receiving a client request directed to the cluster IP address;
multicasting the request to all nodes in the cluster;
each node in the cluster filtering the request based on a dynamically adjustable workload distribution function on each node, wherein the function is configured to allow a single node to process the client request;
a single node in the cluster obtaining a response to the request;
the single node inserting a cluster media access control (MAC) address into the response;
and
sending the response from the single node to the client.

30. (WITHDRAWN) The article of manufacture of claim 29 wherein the method further comprises informing other nodes in the cluster of the cluster IP address and a media access control (MAC) address associated with the node bound to the cluster IP address.

31. (WITHDRAWN) The article of manufacture of claim 29, the method further comprising:

(a) forming a virtual local area network (VLAN) comprising:

- (1) a master node wherein the master node is the node that is bound to the cluster IP address;
- (2) at least one network interface for each node in the cluster; and
- (b) wherein multicasting comprises packet forwarding and processing the client request from the master node to the other nodes in the VLAN.

32. (WITHDRAWN) The article of manufacture of claim 29, the method further comprising:

forming a multicasting group comprising all of the cluster nodes; and
wherein the multicasting comprises automatically multicasting the request to all of the cluster nodes in the multicasting group.

33. (WITHDRAWN) The article of manufacture of claim 32 wherein the multicasting group is formed by setting the MAC addresses of network interface cards of nodes in the cluster to be a multicast MAC address.

34. (WITHDRAWN) The article of manufacture of claim 33 wherein the MAC addresses are set by setting a first bit of a first byte to a certain value.

35. (WITHDRAWN) The article of manufacture of claim 29 wherein the workload distribution function is installed in a driver on each node in the cluster.

36. (WITHDRAWN) The article of manufacture of claim 29 wherein the workload distribution function filters the client request based on workload distribution and whether a packet header of the client request indicates that destination MAC and IP addresses are the cluster IP and cluster MAC addresses.

37. (WITHDRAWN) The article of manufacture of claim 29 wherein the response is sent from the single node to the client without multicasting.

38. (WITHDRAWN) The article of manufacture of claim 29 wherein the workload distribution function distributes the workload by performing a mod operation of a source IP address with a number of nodes in the cluster.

39. (WITHDRAWN) The article of manufacture of claim 29 wherein the workload distribution function distributes the workload by:

representing a total workload observed by the cluster as a bitmap with a number of bits k;

obtaining a bit m by performing a mod operation of a source IP address of the client by the number of bits k; and

assigning the client request to a cluster node that has a specified value at bit m.

40. (WITHDRAWN) The article of manufacture of claim 29 wherein the workload distribution function distributes the workload based on workload statistics that are periodically collected by at least one cluster node.

41. (WITHDRAWN) The article of manufacture of claim 40 wherein cluster nodes periodically exchange workload statistics information.

42. (WITHDRAWN) The article of manufacture of claim 29, the method further comprising:

adjusting a number of nodes in the cluster;

recomputing a workload distribution based on the number of nodes in the cluster; and

redistributing the workload among nodes in the cluster based on the recomputation.

However, Applicants do so with traverse. Applicants dispute the assertion by the Office that the two claim Groups involve separate and distinct inventions.

35 U.S.C. §121 provides that "If two or more independent and distinct inventions are claimed in one application, the Commissioner may require the application to be restricted to one of the inventions." M.P.E.P. §802.01 deviates from the plain meaning of "independent and distinct" by interpreting "and" to mean "or". The Patent Office relies on the absence from the legislative history of anything contrary to this interpretation as support for their position that "and" means "or". Applicants respectfully note that this position is contrary to the rules of statutory construction. Restriction between two dependent inventions is not permissible under the plain meaning of 35 U.S.C. §121.

Applicants further urge the Examiner take into consideration that the subject matter of each of the claim Groups is linked by a common inventive concept.

According to M.P.E.P. §803, there are two criteria for a proper restriction requirement. First, the two inventions must be independent and distinct. In addition, there must be a serious burden on the Examiner if restriction is not required. Even if the first criterion has been met in the present case, which it has not, the second criterion has not been met.

Applicants assert that a search into prior art with regard to the invention of the different Groups is so related that separate significant search efforts should not be necessary. Accordingly, there is no serious burden on the Examiner to collectively examine the different claim Groups of the subject application. Therefore, restriction is not proper under M.P.E.P. §803.

Consequently, Applicants respectfully request the Examiner reconsider and withdraw the restriction requirement. It is also submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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